BIOQUELL

MICROFLOW

ADVANCED BIO SAFETY CABINET (ABS)

CLASS III/I

USER MANUAL

© Bioquell
52 Royce Close,
West Portway, Andover
Hampshire SP10 3TS
United Kingdom

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Tele +44 (0) 1264 835835
Fax +44 (0) 1264 835836
Email enquiries@bioquell.com
Web www.bioquell.com

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Caution:

Please read this Manual thoroughly before attempting to use this unit. If you do not understand or are unsure of any information contained in this Manual please contact your Agent or BIOQUELL for clarification.

BIOQUELL designs, manufactures and supplies a broad range of containment and airflow products, as well as bio-decontamination solutions for:

- Rooms
- Systems and processes
- Laboratory equipment
- Biomedical equipment

For further information and contact details refer to our web site www.bioquell.com

CONTENTS

Foreword

Safety Environmental Conditions

1 Introduction and Principle of Operation
1.1 Responsibility of the User

2 Specification
2.1 Operating Environment
2.2 Construction
2.3 Dimensions/Weight
2.4 Electrical
2.5 Alarms
2.6 Lighting
2.7 Filtration

3 Description of the Cabinet
3.1 The Viewing Panel/Front Door
3.2 Airflow Patterns
3.3 Working Area
3.4 Pressure Gauge
3.5 Breather Filter
3.6 Plenum Chamber and Non Return Valve
3.7 Electrical Control

4 Installation
4.1 Position of the Cabinet
4.2 Position of the Fan
4.3 Preparation for Use

5 General Instructions
5.1 Control Panel
5.2 Additional Features
5.3 Work Surface
5.4 Cabinet Mains Power Connection
5.5 Exhaust Filter Sample Port

6 Operating the Cabinet
6.1 Pre-filters
6.2 Main Filters
6.3 Hydrogen Peroxide Connections
6.4 U.V. Light

7 Optional Extras
7.1 Solenoid Operated Gas Inlet
7.2 Mains Socket
7.3 Services Tap
7.4 Formalin Vaporiser
7.5 Fireboy Gas Burner
7.6 Touch-o-matic Gas Burner
7.7 Rotating Vane Anemometer
7.8 Base Assembly
7.9 Volt Free Contact
7.10 Internal Socket Residual Current Device
7.11 Ultra Violet (UV) Light

8 Decontamination of the Cabinet
8.1 Swabbing Down
8.2 Bio-decontamination

9 Maintenance
9.1 Daily/Frequently
9.2 Weekly/Monthly
9.3 Annual Maintenance, Testing and Re-Calibration
9.4 Pre-filter Replacement
9.5 Filter Servicing
9.6 Fluorescent Tube Replacement
9.7 UV Tube Replacement
9.8 Circuit Protection
9.9 Gloves

10 Care and Cleaning
10.1 Bio Organism Removal Cleaning
10.2 Stainless Steel Components
10.3 Plastic Components
10.4 Painted and Other Components

11 Control System: Customisation and Calibration
11.1 Introduction
11.2 Installing the set-up program
11.3 Customisation of controls
11.4 Menu Bar

12 Calibrations
12.1 Calibration of Airflows and Alarms
12.2 Calibration of Pressure Gauge

13 Trouble Shooting

14 Spares

15 Servicing Record

16 EC Declaration of Conformity

Appendices

1 UK Approved Service Company

2 Safety Symbols

3 Warranty Information

FOREWORD

This manual has been specially prepared to give guidance in the use and maintenance of the:

MICROFLOW
CLASS III/I
ADVANCED BIO SAFETY CABINET (ABS)

WARNINGS:

(1) USE OF THE APPLIANCE IN A WAY OTHER THAN DESCRIBED IN THIS MANUAL COULD PROVE TO BE VERY DANGEROUS.

(2) GERMICIDAL LAMP. EMITS UV RADIATION 253.7 nm. EXPOSURE WILL CAUSE DAMAGE TO SKIN AND EYES. VACATE AREA WHEN IN USE.

A list Safety Symbols used on the Cabinet labels is provided in Appendix 2.

In order to utilise the full operator protection factors given by the cabinet, it is essential that the operator is fully familiar with the cabinet and all of its functions and controls. This manual should be thoroughly studied before the cabinet is used.

This manual contains the operational and first line maintenance instructions. Service and maintenance operations other than those covered by this manual should only be undertaken by BIOQUELL's recommended service agent, see Appendix 1.

Care should be taken to follow the instructions in this manual to ensure safe operation. However, if further clarification is required contact your supplier.

SAFETY ENVIRONMENTAL CONDITIONS

The cabinet is for indoor use only.

For use at altitudes up to 2000 m.

The unit is safe to run electrically between 5°C and 40°C at 10 to 80% humidity, however the unit ought not to be operated outside a temperature range of 10 to 35°C and at a relative humidity of greater than 60% for it to give the designed operator protection.

Installation category (overvoltage category) II (BS 7671).

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1 INTRODUCTION AND PRINCIPLE OF OPERATION

The Microflow ABS Class III/I Cabinet external features are shown in Fig. 1.

Figure 1 Microflow ABS Class III/I Cabinet - General View

The Microflow Cabinet is the result of many years experience in the development and use of Safety Cabinets and should give long and trouble-free service provided these simple instructions are followed. The Microflow ABS Class III/I Cabinet is designed to offer maximum protection when used in the Class III mode whilst offering the versatility of adaptation to a Class I Cabinet when required for work on less dangerous pathogens. It is important to understand that the Cabinet was designed as a Class III unit for working with Category '4' pathogens, but can also be adapted to operate in a Class I mode; it is not a Class I Cabinet that may be upgraded to Class III.

The Cabinet in the Class II mode has been designed for air to enter via a HEPA filter inlet mounted on the side. This filter is of the same grade as the main exhaust filter and therefore provides a stream of sterile air into the Cabinet. When the Cabinet is in Class III mode the mean volumetric inflow is approximately 0.25 m^3/s. The Cabinet when used in this way therefore provides the best possible environment to keep samples free from external contamination and operator protection.

With the glove panel removed the Cabinet may be used as a Class I unit, which protects the operator by causing a stream of air to pass in through the front of the Cabinet. The velocity of this air stream is set up to be between 0.7 m/s and 1.0 m/s (which is required by BS EN 12469) at which speed aerosols will be contained inside the Cabinet. At velocities lower than 0.7 m/s there is a possibility that

high energy aerosols may be projected out of the Cabinet against the air stream and also that the air passing over the operator's arms will be insufficient to allow for effective scrubbing. At velocities exceeding 1.0 m/s there is a danger that turbulence may be generated thus causing some eddies to eject particles from the Cabinet.

The effluent air is passed through a High Efficiency Particle Filter (HEPA) which removes for all practical purposes all the particle matter thus rendering the effluent safe. Microflow Cabinets are tested in accordance with BS EN 12469:2000. Class I Cabinets are recommended to give protection to operators when handling Category 3 organisms. Class III Cabinets are recommended for use with Category 4 organisms. This Cabinet should not be used for Toxic or radio active substances.

1.1 RESPONSIBILITY OF THE USER

It is not possible to detail all the Safety requirements for every procedure undertaken inside a Safety Cabinet. It is the responsibility of the user to ensure safe and proper techniques. Please do not hesitate to contact us for advice.

2 SPECIFICATION

2.1 OPERATING ENVIRONMENT

The cabinet will operate satisfactorily in environments where the ambient temperature lies between 10 and 35˚C and the relative humidity does not rise above 60%. Condensation of moisture on the cabinet must be avoided at all times, as this will affect filter efficiency.

2.2 CONSTRUCTION

The outer shell is of mild steel sheet finished in white powder coating. The work area is made from 316 stainless steel. Special attention has been paid in the design and construction to avoid crevices. The front glove port and transfer hatch doors are made from polycarbonate.

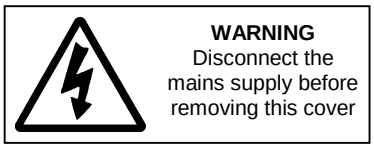
2.3 DIMENSIONS/WEIGHT

		1.0 m CABINET	1.2 m CABINET
Height (mm)		1580	1580
Depth (mm)		748	748
Width (mm)	Internal	1826	2086
	External	1000	1200
Weight (kg)		220	250

There maximum load of 25kg which can be placed on the cabinet floor with a foot print of 300mm by 300mm. Large point loads must be avoided.

2.4 ELECTRICAL

Always disconnect the mains supply before removing any cover displaying the following label:



The ABS cabinet has two power supply options:

(a) 230 V ±10%, 50/60 Hz single phase supply.
(b) 120 V ±10%, 60 Hz single phase supply.

The power consumption is: 1.0 m cabinet = 760 W
1.2 m cabinet = 800 W

The internal control system operates at 5 V.

2.5 ALARMS

Safety has been considered the primary factor in the design of this cabinet. Consistent with this, an alarm condition will be indicated when the inflow velocity is out of specification (high and low limits settable).

Activation of this alarm causes an audible and visual signal.

2.6 LIGHTING

Fluorescent tubes provide a lighting level in excess of 800 Lux over most of the working area.

2.7 FILTRATION

High efficiency filtration is provided by narrow pleated HEPA filters giving an efficiency of not less than 99.997% at 3 micron. All filters are to class H14 of EN1822-1.

As standard a single exhaust HEPA filter is fitted, a second exhaust HEPA Filter must be fitted in the exhaust duct to comply with EN12469:2000. If it is not possible to fit the second HEPA filter in the exhaust duct then a second exhaust filter within the cabinet is available as an option.

2.8 AIRFLOW AND PRESSURE DROP

Cabinet width	Airflow m^3/hr		Single Exhaust Filter Pressure Pa		Double Exhaust Filter Pressure Pa	
	nominal	maximum	Class I	Class III	Class I	Class III
1.0m Cabinet	587	691	300	430	420	650
1.2m Cabinet	710	835	330	560	450	680

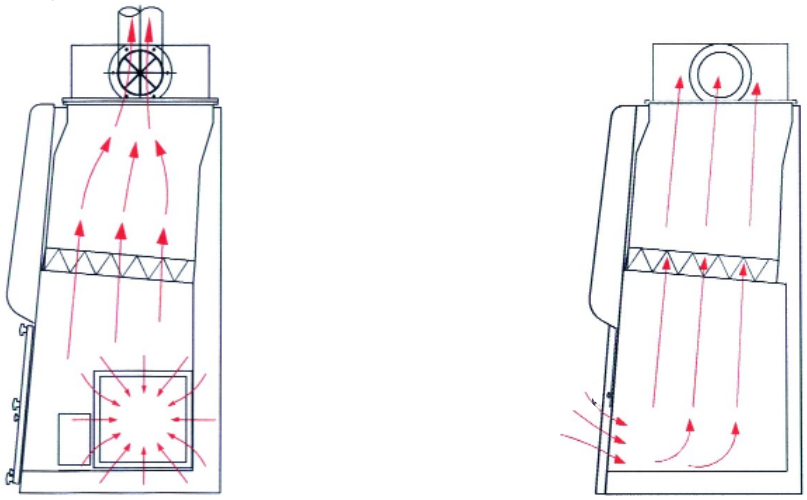
3 DESCRIPTION OF THE CABINET

3.1 THE VIEWING PANEL/FRONT DOOR

The Viewing Panel/Front Door is constructed from metal and polycarbonate and incorporates the Glove Port Panel. The Door clamps firmly against the soft rubber seals. The clamps are located at the extremities of the door. With the Glove Ports Panel removed the Cabinet may be used as an open fronted Class I Cabinet.

3.2 AIRFLOW PATTERNS

The airflow patterns for Class III and Class I modes are shown in Fig. 2. (Note a single exhaust filter is shown, a double filter version is available)



Class III Class I

Figure 2 Class III and Class I Mode Airflow Patterns

3.3 WORKING AREA

The working are is made of high grade stainless steel. The table below gives the working area for the two sizes available:

Description	Height (mm)	Width (mm)	Depth (mm)
ABS Class III/I 1.0	635	1000	640
ABS Class III/I 1.2	635	1200	640

The safe working area in Class I mode is the working enclosure from 100mm behind the front aperture. The safe working area in Class III mode is the whole working enclosure. In both cases the transfer hatch is not part of the safe working area.

3.4 PRESSURE GAUGE

A pressure gauge is fitted to the front cover of the Cabinet to indicate the internal negative pressure when the Cabinet is running in the Class III mode.

3.5 BREATHER FILTER

A HEPA filter with its own pre-filter and blanking panel are fitted to the Cabinet, see Figs. 3 and 4. This allows a stream of sterile air to pass into the Cabinet when used in the Class III mode. It is important to open or remove the Blanking Panel during operation as a Class III Cabinet but at all other times the Blanking Panel should be in place. To open the Blanking Panel undo the two locks with a key and swing it open on the hinges. The panel can then be completely removed by lifting it up and off the hinges.

Figure 3 Breather Filter - Blanking Panel Fitted

Figure 4 Breather Filter – Blanking Panel Removed

The Pre-Filter mounted on the face of the Breather Filter should be changed at regular intervals. We would suggest this is carried out when the working area pre-filter is changed.

3.6 PLENUM CHAMBER AND NON RETURN VALVE

There is a Plenum Chamber and Non Return Valve after the HEPA exhaust HEPA filter(s). This is to stop 'blow-back' and may not be 100% gas tight. The plenum may be turned so that the exhaust ductwork may be taken either from the right or left hand side.

3.7 ELECTRICAL CONTROL

The electrical and control components are located under the front cover and in the side panel.

4 INSTALLATION

WARNING:
INSTALLATION SHOULD ONLY BE CARRIED OUT BY TRAINED AND APPROVED ENGINEERS OR AGENTS.

BIOQUELL OR ITS AGENTS CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE, LOSS OR INJURY CAUSED BY, OR RESULTING FROM, INCORRECTLY INSTALLED EQUIPMENT.

4.1 POSITION OF THE CABINET

The correct functioning of a Safety Cabinet can only be achieved if the Cabinet is properly installed. The position of the Cabinet in the Laboratory is important. Advice on the siting of Cabinets is given in 'The Code of Practice for Prevention of Infections in Clinical Laboratories and Post Mortem Rooms' published by HMSO and BS EN 12469:2000 and BS5726:2000. The following points should be observed in selecting the position for the Cabinet:

(a) Is the room of adequate size? About 900 cubic feet is generally considered to be the minimum unless special provision is made for make-up air.

(b) Is the make-up air adequate?

(c) Will the Cabinet be subject to cross movements of air generated either by open windows, the ventilation system, or doors being opened and closed near the Cabinet?

(d) Is there space behind the operator movement of other staff without disturbing the air flow patterns?

It is recommended that a smoke test be performed in the laboratory where a Cabinet is to be sited to ensure that there are no adverse movements of air. A smoke test should also be conducted after the Cabinet has been installed to check the air movements and room pressure while this Cabinet is running.

4.2 POSITION OF THE FAN

The Fan should be positioned at the exhaust end of the ductwork which should terminate outside, thus ensuring that internal ductwork is kept under negative pressure. Should it be necessary to install the Fan inside the building then the ductwork from the Fan to the outside of the building must be kept as short as possible and never longer than two metres. Ductwork should be constructed from a smooth non-porous material, e.g. rigid PVC. The length of the ducting should be kept as short as possible; the maximum permissible pressure drop in the ductwork is 0.4 in. wg (100 pa).

We recommend the use of 160 mm nominal diameter rigid PVC ductwork. The connecting spigots on both the Cabinet and Fan Box have been manufactured to match this diameter of ductwork so the connections may be made using soft PVC sleeves that slide over the ducting and the spigot and are retained by stainless steel bands.

A HEPA filter ought to be installed in the duct work to comply with EN12469:2000, if the unit is fitted with only one exhaust filter (standard).

4.3 PREPARATION FOR USE

In order to utilise the full operator and product protection factors given by the cabinet, it is essential that the operator is fully familiar with the cabinet and all of its functions and controls. This manual should be thoroughly studied before the cabinet is used.

When commencing use, the following procedure must be followed for safe operation; abbreviated instructions are shown on the Control Panel:

(a) Plug in the power lead, if applicable. Switch on power at the switch located at the power entry point.

(b) Confirm that the blue LED on the control panel is lit, indicating that mains power is applied to the cabinet.

(c) Press and hold down the 'TEST' button. All LEDs on the keypad should light and the buzzer should sound. If not, the cabinet should not be used and maintenance advice sought.

(d) Press the 'FAN' button.

(e) It is possible that after the stabilising process, the buzzer sounds and the display advises of an airflow alarm. The possible causes are as follows:

  (i) The first time the cabinet is switched on following a maintenance operation involving use of the set up software.

  (ii) The environment of the cabinet is at the extremes of its operating temperature (10 - 35˚C).

  (iii) If the cabinets airflow pattern has been recently disturbed, e.g. exhaust obstructed.

  In any of these cases, the alarm can be expected to clear and display report a safe condition after waiting a few extra seconds.

(f) If an airflow alarm is still displayed after 3 minutes from switching on the cabinet, the unit should not be used and advice sought from your Safety Officer or Supplier.

(g) Other safety alarms that are self-explanatory if the display is consulted include:

(i) Warning: Flow Sensor failure.

(ii) Warning: Window locked shut.

This warning is displayed when the Glove Ports Panel is fitted and the Filter Blanking Panel closed.

(iii) Fan off Window open.

(iv) Fan 100 % Battery fail.

5 GENERAL INSTRUCTIONS

5.1 CONTROL PANEL

The touch controls are located on the Control Panel (Fig. 5) and are described in the following paragraphs.

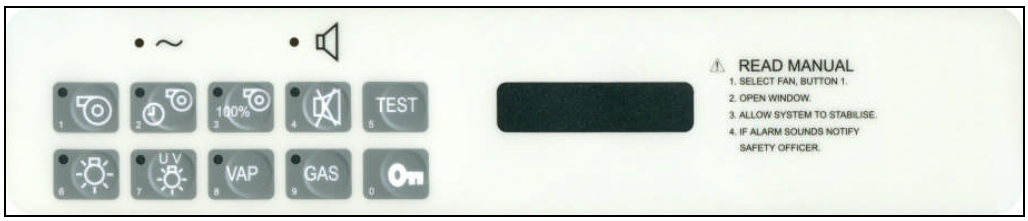
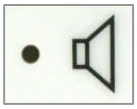


Figure 5 Control Panel (for illustration purposes only)

5.1.1 Mains Power Indicator

The blue indicator is lit when the mains supply has been connected to the cabinet. The indicator remains lit at all times.

5.1.2 Alarm indicator



The alarm indicator flashes whenever an alarm condition occurs. Additionally, unless muted by pressing the MUTE button, the buzzer emits an alternating two tone signal to give warning of an alarm condition.

5.1.3 Fan Control

Operation of this switch causes the cabinets internal or external fan together with the airflow control system to operate. Alarms are muted for a period of about 1 minute during which time the display will show the message 'STABILISING FLOW'. If after this time no alarms are active the correct airflow will have been established and the display will show an appropriate message, for example 'CABINET SAFE'.

A second press of the fan button causes the fan(s) to be switched off. Alternatively, one of the other fan controls, or the vaporisation cycle can be selected to provide the desired action.

5.1.4 Fan Off Delay

Pressing this button when the fan has been running (LEDs of buttons with numbers (1) or (3) lit) will cause the fan to be switched off after expiry of a timed period.

The delay period is configurable from the set-up software. See Section 11 'Control System: Customisation and Calibration'.

Pressing this button a second time cancels the remaining delay time and switches off the fan(s).

Once the fan delay is activated, it can alternatively be cancelled by pressing either of the other two fan functions: buttons (1) or (3). This will initiate the relevant function

5.1.5 Fan 100%

Pressing this button will cause the cabinet's internal or external fan to operate at full speed. This facility is intended for emergency use after a spillage or other inadvertent activity

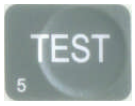
A second press of this button will switch the cabinet's internal or exhaust fan off. Alternatively, either of the other two fan buttons can be pressed in order to select the desired action.

5.1.6 Alarm Mute

When an alarm condition occurs, the buzzer will sound. Pressing this button will cause the buzzer to be muted for a configurable time period of between 0 and 255 minutes. See Section 11 'Control System: Customisation and Calibration'. The default setting is 4 minutes. Cabinets to BS EN 12469 require the default setting at 0 minutes.

The intermittent beeping that accompanies: 'FLOW STABILISATION', 'EXPIRED SERVICE DATE' messages, or attempts to select incompatible conditions are not muted.

5.1.7 Test



Correct operation of button indicators and the audible alarm may be checked by pressing the 'TEST' button; all indicators should light and the buzzer should sound with a continuous tone.

The 'TEST' function serves the secondary purpose of allowing the 'HOURS RUN' and 'SERVICE DATE DUE' information to be displayed. This data is useful in the planning of maintenance operations.

5.1.8 Fluorescent Lights

Pressing this button turns on the cabinet's fluorescent lighting. With power connected to the cabinet, the lights can be switched on at any time.

If UV lamp is in use or the UV lamp switch has been pressed (UV lamp switch LED lit), it will automatically be switched off when the fluorescent light is selected.

5.1.9 UV Lamp

WARNING:
DUE TO ITS HAZARDOUS EFFECTS, THE CABINET OPERATOR SHOULD AVOID ANY EXPOSURE TO UV RADIATION.

When selected, the UV lamp will remain on for a configurable time period after which it will automatically switch off. The default setting is 15 minutes.

The time period for which the UV lamp remains on can be changed, see Section 11 'Control System: Customisation and Calibration'.

5.1.10 Vaporisation Cycle

Pressing this button initiates the fumigation process. See Section 8.2.2 Formalin Fumigation' for the fumigation procedure.

5.1.11 Gas Supply

As a safety feature, in series with the gas supply tap is a solenoid valve, which is controlled from the control panel. Thus, the gas supply can only be selected if the airflow is in a safe condition (i.e. no alarms are active). Once the valve has opened, gas supply can be controlled via the tap inside the cabinet in the usual way.

Caution:
The solenoid valve will automatically close the gas supply, if an alarm occurs during the time it is selected.

5.1.12 Keylock and PIN Number Change

Keylock

This button provides the facility to lock the buttons associated with fan control.

PIN Number Change

Pressing the button followed by entering the appropriate code will prompt the user to enter a new four digit number. (See para 12.1.15)

5.2 ADDITIONAL FEATURES

5.2.1 Automatic Air Velocity Control

The control system automatically compensates the airflow for the dirtying of filters and variations in the mains power supply. Whenever the airflow is within safe operating conditions, the display reports the message 'CABINET SAFE'.

If an alarm condition is detected, the buzzer will sound and the alarm LED will flash; the cause of the alarm will be reported on the display.

After switching on the cabinet from cold, an airflow alarm may occur for a short period. This is due to the stabilisation of flow sensors and airflows. During stabilisation, the display shows the message 'STABILISING FLOW'.

5.2.2 Automatic Fan Start After Power Failure

In the event of power disconnection from the cabinet while the fan is operating, reconnection of the power will cause the fan to start. However, all other functions will be automatically set to off and, if required, they must be reselected.

5.2.3 Set-up Software

Refer to the Supplier or the Maintenance Provider.

5.2.4 Hour Meter and Service Date Due

These parameters can be viewed on the display by pressing the 'TEST' button.

5.3 WORK SURFACE

The actual working surface is lower than its edges so that minor spillages will be contained.

5.4 CABINET MAINS POWER CONNECTION

Mains power connection to the cabinet is made by the use of a standard IEC 3 pin connector assembly incorporating dual pole fusing and an isolator switch (Fig. 6).

Figure 6 Mains Connector and Switch

5.5 EXHAUST FILTER SAMPLE PORT

This port is provided to ease access for testing of the exhaust filter, particularly in cabinets with top boxes/ducting etc.

A sample port is located on the top right hand side of the cabinet.

Connection to the port is made by depressing the outermost (locking) ring and then pulling the red blanking plug from the fitting. A nylon tube of outside diameter 8 mm maximum can then be pushed in the hole to make a connection. After testing is completed remove the tube and the refit blanking plug.

The zone sampled could be under positive or negative pressure, so this should be considered when connection is made. The port is useful during setting up of the cabinet after a filters change or for checking the integrity of the exhaust filter.

6 OPERATING THE CABINET

At all times when the Fan is not running the front aperture of the Cabinet should be sealed with the Closure Door or Glove Ports Panel in position. The following procedure is suggested for starting the Cabinet:

(a) Switch on the fan

(b) If operating the cabinet in the Class I mode, remove the Glove Ports Panel (see Fig. 7) and ensure that the Breather Filter Blanking Panel is closed. Removal of the Glove Ports Panel will activate the fan to run.

Note:
The safe working area in the Class I mode is the working enclosure from 100 mm behind the front aperture, but not the transfer hatch.

Figure 7 Glove Ports Panel Removed

If operating the cabinet in the Class III mode, the Glove Ports Panel should be left fitted to the cabinet and the Breather Filter Blanking Panel should be removed (see Fig. 4). Removal of the panel will activate the fan run. Ensure that the glove panel is properly aligned and secure, the seal is compressed all the way around and a part of a glove or other foreign material is not obstructing the seal.

Note:
The safe working area in the Class III mode is the whole working enclosure, but not the transfer hatch.

(c) If it is necessary to install large items of equipment, this should only be done if the Cabinet has been sterilised. The Main Sight Glass Door should only be opened after sterilisation (see Fig. 8). To remove the Main Sight Glass Door

undo the eight hand screws and lift off (note that the panel is not attached to the Cabinet).

Figure 8 Main Sight Glass Removed for Loading

(d) The transfer hatch is a convenient method of safely transferring material or equipment in and out of the unit without breaking containment into the working area. There are two polycarbonate doors, one between the working area and the transfer hatch and one between the hatch and the outside. Only one of these doors ought to be opened at any one time, otherwise unfiltered air will go straight into the work area.

Turning both catches a quarter of a turn opens the door.

(d) The Cabinet may, if required, be decontaminated by using either the Formalin Vaporiser or a Clarus Hydrogen Peroxide Gas Generator (see Section 8).

BIOHAZARD WARNING:
SHOULD IT BE NECESSARY TO CHANGE THE FILTERS OR PRE-FILTERS, THE CABINET SHOULD BE DECONTAMINATED FIRST.

6.1 PRE-FILTERS

Pre-filters are intended to extend the useful life of the Main Filters by removing the larger particles from the air stream. They therefore become loaded more quickly than the more expensive Main Filters and to ensure the proper working of the Cabinet should be changed regularly. It is not possible to be precise about

the interval between changing of the Pre-Filters as this depends on the atmospheric conditions and the use of the Cabinet. In a new building where there are substantial amounts of building dust or in built-up areas, the Pre-filters will require changing more frequently than in an area where the air is clean. In general they may be expected to last between 6 and 12 weeks but a good guide is the colour and appearance of the Filters. Under no circumstances should they be allowed to become so dirty that there is a danger of particles falling off and contaminating work in the base of the Cabinet.

6.2 MAIN FILTERS

The life of a Main Filter should be several years, and our staff will advise during service calls when it is advisable to have these changed.

6.3 HYDROGEN PEROXIDE CONNECTIONS

The Cabinet is fitted with connections designed to enable integration with a Clarus Hydrogen Peroxide Gas Generator to bio-decontaminate the Cabinet (see Section 8 for details).

WARNING:
DO NOT USE THE BLOCK OR PIPES FOR LIFTING.

6.4 U.V. LIGHT

The U.V. light is not recommended for use in Safety Cabinets in EN 12469:2000 and is an inappropriate method to de-activate category 4 pathogens.

If a U.V. high level light is permanently fitted, it is operated by use of the U.V. light switch (see section 5.1.9). The glove port must be fitted for the light to work.

WARNING:
DUE TO ITS HAZARDOUS EFFECTS, THE CABINET OPERATOR SHOULD AVOID ANY EXPOSURE TO UV RADIATION.

7 OPTIONAL EXTRAS

7.1 SOLENOID OPERATED GAS INLET

Gases for use inside the cabinet are supplied via a solenoid valve (located behind the side panel) which permits gas to flow only when the cabinet fans are operating and airflow levels are within the specified parameters. Switch on the gas supply by pressing the button marked 'GAS' on the Control Panel. The gas flow can then be controlled at the tap.

7.2 MAINS SOCKET

A single mains socket can be fitted to the side wall of the cabinet. Equipment in excess of 300 W should not be connected to this socket. If this value is exceeded, the circuit breaker will trip. The circuit breaker is located on the top right of the cabinet adjacent to the mains connection socket and on/off switch.

Electrical safety test on the electrical socket has a maximum permitted earth leakage of 0.5 mA.

7.3 SERVICES TAP

In addition to the solenoid operated inlet, a second tap without an interlock valve is provided. This valve can be used to connect air vacuum or non-hazardous gas supplies to the cabinet.

7.4 FORMALIN VAPORISER

A Formalin Vaporiser (Fig. 9) can be fitted to the cabinet to provide a convenient method for decontamination. The vaporiser can function as part of the integrated fumigation cycle. Refer to Section 8.

Figure 9 Formalin Vaporiser

7.5 FIREBOY GAS BURNER

This burner has been designed for use in Safety Cabinets and Laminar Flow Units and can be supplied with a foot-operated switch. The switch operates a solenoid valve allowing the gas to flow and at the same time initiates its ignition. The burner can either be set for a fixed time of operation or can be extinguished by pressing the foot switch a second time. The advantage of this type of burner is that the flame is only present when actually needed and so causes minimum disturbance to the airflow pattern within the cabinet.

7.6 TOUCH-O-MATIC GAS BURNER

This is a gas burner, which is operated by a palm control. The control is linked to the gas burner and operates a valve to allow passage of gas; a pilot flame in the burner ensures immediate combustion of the gas. The flame is extinguished by the release of the palm control and its size and intensity can also be varied.

7.7 ROTATING VANE ANEMOMETER

A high quality 4 in. (100 mm) Rotating Vane Anemometer is offered for use with the Advanced Bio Safety Cabinet.

It is necessary to check the airflow through the Glove Ports Panel aperture in Class I mode and the Breather Filter in Class III mode at the following times:

(a) On completion of installation.

(b) Whenever the cabinet is moved or disturbed.

(c) When new filters are fitted.

(d) As part of a maintenance schedule or as specified by your Safety Officer. The frequency of this will depend on many factors but should be a minimum of once every month.

To check airflow compliance with specification BS EN 12469 refer to Section 12 ‘Calibration of Airflow and Alarms’.

7.8 BASE ASSEMBLY

For applications where bench space is not available for the cabinet, a tubular steel base assembly is available to make the cabinet free standing. The white base assembly is fitted with either adjustable feet or swivel castors.

7.9 VOLT FREE CONTACT

An option is available so that continuous remote monitoring of cabinet operating status can be performed. Interfacing to the cabinet is via a multi-way plug located on the top surface of the cabinet.

Parameters which affect the closing of relay contacts are:

(a) Cabinet fan on.

(b) Airflow alarm active.

Contacts are rated at maximum 1 A at 24 V a.c. or d.c. Refer to Fig. 10 for connection details.

DESIGNATION	CONNECTION	ALARM
A	N.O	Airflow Alarm On
B	N.C	
C	Common	
D	N.O	Cabinet Fan On
E	N.C	
F	Common	

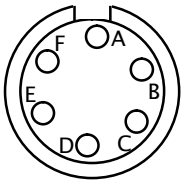


Figure 10 Volt Free Contact Wiring

7.10 INTERNAL SOCKET RESIDUAL CURRENT DEVICE

As an additional operator safety feature, a Residual Current Device (RCD) is available and, when fitted, is located adjacent to the circuit breaker on top of the cabinet. The device will isolate power to the socket if a difference in currents flowing along live and neutral conductors exceeds 30 mA.

To set (or reset) the RCD, push the black lever to the On position. It is recommended that the RCD is checked for correct operation before each time it is (re)set. To test, press the TEST button on the RCD once the black lever has been set to On; the black switch should then immediately go to the Off position.

7.11 ULTRAVIOLET (UV) LIGHT

A permanently fitted, high level version is available, see section 6.4 for details.

8 DECONTAMINATION OF THE CABINET

8.1 SWABBING DOWN

It is recommended that the cabinet be kept clean and free of dust by swabbing down or washing down with a suitable disinfectant. Disposable gloves should be worn for this task.

8.2 BIO-DECONTAMINATION

Bio-decomtamination would be necessary at the following times:

(a) Before carrying out any maintenance work.

(b) Before changing high efficiency filters or pre-filter.

(c) Before performance testing is carried out.

(d) Before moving, relocating or in any way disturbing the cabinet.

(e) Before instituting a change in the work program.

(f) After a gross spillage - as defined by your Safety Officer.

(g) To decontaminate any equipment or materials before their removal from the cabinet.

(h) Periodically as required by your Safety Officer.

The Cabinet must be externally exhausted. There must be no possibility of the exhaust leaking into areas where personnel are likely to be present, and likewise with the exhaust outlet.

There are two methods of bio-decontamination, Hydrogen Peroxide Gassing (para 8.2.1) and Formalin Fumigation (para 8.2.2). Hydrogen Peroxide is preferable as it is residue free, is less dangerous (non-carcinogenic) and is a more effective bio-decontaminate.

8.2.1 Hydrogen Peroxide Gassing

This method of bio-decontamination requires a BIOQUELL Clarus Hydrogen Peroxide Gas Generator.

To run a bio-decontamination using a Clarus carry out the following procedure:

(a) Turn the Cabinet fan off.

(b) Ensure that the Cabinet is in the Class III mode with the Glove Ports Panel fitted but also with the Breather Filter Blanking Panel closed.

(c) Open the internal Transfer Hatch door.

(d) Connect the large diameter supply hose and blue return hose, and the pressure tube to the connectors on the rear of the Clarus L2.

Connect the other end of the hoses and the pressure tube to the corresponding connectors on the right-hand side of the Cabinet as shown in Figure 11. The blue hose connects into the top connection and the large diameter hose in the bottom, with the pressure tube connected in the central snap lock. NOTE the connection are 1" as standard for connection to the BIOQUELL EBDS Decontamination service equipment. When connecting to a Clarus Generator the connection will require changing to 1.5".

Figure 11 Cabinet Hose and Pressure Tube Connection

(e) Run a decontamination cycle with the Clarus according to the Clarus manual – refer to BIOQUELL for cycle details.

(e) If there is no risk of exposure to Hydrogen Peroxide through the duct work and out at the exhaust, then it is highly advantageous to Aerate/Purge, through the duct work to reduce the cycle time.

CHECK WITH THE HEALTH AND SAFETY OFFICER FIRST. THERE WILL BE HIGH LEVELS OF HYDROGEN PEROXIDE IMMIDIATELY LOCAL TO THE EXHAUST OUTLET

To Aerate/Purge through the duct work first open the Breather Filter Blanking Panel. Then start the Cabinet's fan.

8.2.2 Formalin Fumigation

Ensure that the cabinet is free of Hydrochloric acid and other Chloro compounds. This will avoid the production of the

carcinogenic product that results from the mixing of formaldehyde and HCl or Chloride gas.

A Formalin Vaporiser (see Fig. 9) is fitted (as an option) to the side wall of the unit. The fumigation of the cabinet is carried out as detailed in the following procedure:

Notes:
(1) Formaldehyde is hazardous: observe handling procedures.

(2) The following procedure is provided for guidance purposes only; your Safety Officer should be consulted for definitive guidance.

As it can be appreciated, the fumigation cycle is straightforward by virtue of the display reporting status and prompting for action when necessary. A safety feature built into the control system is that if the Glove Ports Panel or the Breather Filter Blanking Panel are disturbed during the evaporation or fumigating processes, the fan will automatically be switched on in order to safely expel the fumigant to outside the laboratory. In such a situation the fan will continue to run until the Keylock button is pressed and the fumigation PIN number has been entered for a second time.

The recommended quantities of the solutions used in the following procedures are:

SOLUTION	1.0 m CABINET	1.2 m CABINET
Formalin (ml)	17	22
Water (ml)	17	22

Ensure that the ducting is secure and that any manual valves are open.

Add the formaldehyde solution to the deionised water. This must be carried out in a fume cupboard or a Class I safety cabinet (ducted outside).

Remove the cap of the vaporiser, add the diluted formaldehyde solution and replace the cap.

Fit the Glove Ports Panel and close the Breather Filter Blanking Panel.

Press the VAP switch and enter 2222 (PIN number).

The vaporiser operates automatically and takes approximately 30 minutes to evaporate the contents.

The fumigation cycle is set at 240 minutes.

When the fumigation cycle is complete the display will show the following alternating messages 'Fumigation cycle Purging required' and 'Please open Class III door'.

Open the Breather Filter Blanking Panel to activate the Purging cycle.

Purging will continue until the purge time has expired. The cabinet will then return to normal cabinet functions. Press the Fan button and the airflow will stabilise to allow safe operation.

Run the Cabinet as normal and check the room with a Formaldehyde Meter.

A description of the ducted cycle is provided in Table 1.

Table 1 Fumigation Ducted Cycle

ACTION	PROCESS	DISPLAY MESSAGE
Press VAP	Start Cycle	'Enter PIN Number'
Enter four digit Number.	Vaporiser powered to evaporate formalin. Vaporiser powered for xx* minutes. Formalin sterilises inside of the cabinet. Fumigation completed	'Evaporation: xx mins to run' 'Fumigating xx mins to run' Alternating messages: 'Fumigation cycle Purging required' and 'Please open Class III door'
Open Breather Filter Blanking Panel	Fan will start to purge fumigant from cabinet. When purge time is expired, the cabinet will resume normal operation.	'Purging xx mins to run'

* 'xx' Denotes a preconfigured time which counts down in minutes.

9 MAINTENANCE

The Biological Safety Cabinets have been designed to give many years' trouble-free efficient service and to keep maintenance to a minimum. However, to ensure this, they must be regularly cleaned and checked.

A full maintenance service is offered by BIOQUELL. Overseas, this same service is offered by the BIOQUELL distributors.

In addition to this, however, operators should carry out the following procedures on a schedule agreed with the Safety Officer, so as to ensure that the cabinet is always in first-class working order.

9.1 DAILY/FREQUENTLY

(a) Keep the unit clean externally as well as internally. It should be wiped over with a damp cloth using a proprietary bactericidal solution. The front viewing panel should be kept clean so that the operator always has a clear view of work being performed inside the cabinet.

(b) Ensure that the audible alarm and all indicators are functioning by pressing the 'TEST' button. Any faults should be corrected before the cabinet is used.

(c) Check the airflow in the unit and at the exhaust filter as described in the relevant standard.

(d) Visually check that the exhaust filter is free of any obstruction that may impede airflow.

(e) Check for damage to the gloves.

(f) Check the pressure is less than -200 Pa.

9.2 WEEKLY/MONTHLY

In addition to the above the following checks should be carried out:

(a) Visually check for damage to the seal on the front of the cabinet which is compressed by the glove port panel.

(b) Inspect all mains cables to the cabinet, or to any extras that may have been fitted, for damage or wear. In the event of any fault being discovered, contact a BIOQUELL approved service company.

(c) Inspect external Pre-filter.

9.3 ANNUAL MAINTENANCE, TESTING AND RE-CALIBRATIONS

It is recommended that the annual service visit is carried out by BIOQUELL or its local distributor. The service shall consist of the following:

a) Visually check the cabinet internally and externally for surface defects, cracks or other damage.

b) The Pre-filter is replaced.

c) Checking and re-calibration if required of the pressure gauge.

d) Extract duct work to be examined where practicable, for defects, cracks or other damage.

e) All alarms to be checked and tested.

f) Filter and seal integrity checked using DOP.

g) When in Class III the airflow through each glove port when each glove in turn is removed. The airflow in through the inlet filter ought to also be checked. When in Class I mode the airflow through the front with the glove panel removed ought to be checked.

h) The internal pressure ought to be checked is less than -200 Pa.

9.4 PRE-FILTER REPLACEMENT

Pre-filters should normally be changed during the six monthly service. However, if the pressure drop across the filters is such that correct airflow cannot be maintained, before the service is again due, it may be changed by carrying out the following procedure:

(a) Fumigate the cabinet as previously described.

(b) With the fan running and wearing protective gloves, lift the front of the pre-filter holding frame and push it back approximately 12 mm. The frame can then hinge downwards allowing the pre-filter media to be removed.

(c) Place the old media into a suitable bag, which should be sealed and removed for incineration.

(d) Fit new pre-filter media and replace the frame in its proper position.

9.5 FILTER SERVICING

WARNING: FILTERS MUST BE DECONTAMINATED PRIOR TO REMOVAL. WHEN REMOVED THEY MUST BE BAGGED AND DISPOSED OF IN A SAFE MANNER.

It is recommended that this done by a trained service provided. If it is necessary to change the filters the following procedure ought to be followed:

Breather Filter

The breather filter can be replaced by firstly opening the blanking plate and then removing it by lifting it up and off the hinges. Then remove the flange on which the hinges to the blanking plate are attached. This is done by removing the bolts on the inside of this flange. Once the flange is removed the Breather filter can be slid out and replaced.

After placing a new filter in position and replacing the flange the filter seals must be checked using DOP or other similar method.

Exhaust Filter(s)

WARNING: The CABINET MUST BE SWITCHED OFF AND DISCONNECTED FROM THE POWER SUPPLY

First the four nuts holding down the 'top box' which is located on the cabinet must be removed. Lift off the top box and place somewhere safe.

Remove the screw at either side of the cabinet, which holds the front cover down. Then lift the front cover, and place the two support arms on either side into the corresponding grey holders on the cabinet.

Lift the top of the ductwork inside of the cabinet and remove the short spacer. Next remove the plenum which is the part over the filter, this can be done in two ways:

a) Lift the back of the plenum up by about 30mm (1") and push back. The back of the plenum will now be supported on two brackets at the back. Then lift the front of the plenum up and hold it by placing the hook on the wire (located inside at the top) through the eye attached to the plenum. Then slide out the filter.

b) Remove the two tubes going into the plenum by pushing down on the red ring and pulling-up and removing the tube. Then lift and remove the whole plenum.

NOTE if there are two HEPA filters method (b) must be used. When fitting the new filter be careful not to damage the seals. Put the cabinet back together by following the procedure in reverse order.

9.6 FLUORESCENT TUBE REPLACEMENT

WARNING: The CABINET MUST BE SWITCHED OFF AND DISCONNECTED FROM THE POWER SUPPLY

Remove the screw at either side of the cabinet, which holds the front cover down. Then lift the front cover, and place the two support arms on either side into the corresponding grey holders on the cabinet. Remove the ends off the tube by simply pulling away, and then unclip the tube from the holders. Place the new tube in the holders, place the end on and fit down and secure the front cover

9.7 UV TUBE REPLACEMENT

Remove the main sight glass off the front of the cabinet. This will give access to the UV light at the back of the unit. To change the tube simply rotate the tube by 90 degrees and pull to the front. Place the new tube in the holder by doing the above in reverse order.

9.8 CIRCUIT PROTECTION

There are two fuses located next to the power entry socket (Note the 120V version does not have any fuses but an overload trip instead). To gain access to the fuses push the little tab in and pull the ‘drawer’ up and out. The two fuses are attached to the ‘drawer’. Replace always with T10 Amp fuses.

Changing of any fuses on the control board must be carried out by a trained technician.

9.9 GLOVES

The glove ports on the cabinet are 150mm diameter (6 inch) and are round. Gloves being fitted must be suitable for this Port size. The actual glove cuff diameter will vary depending on material and

manufacturer's recommendations, but ought to be approximately 146mm in diameter.

10 CARE AND CLEANING

10.1 BIO ORGANISM REMOVAL CLEANING

Special attention for cleaning must be given to the sight door and glove port panel seals, the recommended method is to fully remove the rubber seal and clean thoroughly with a chlorine based disinfectant. Then clean the exposed metal/plastic liner as described below and finally thoroughly wash the rubber seals with sterile water and refit.

All MSCs should be kept clean and free of unnecessary equipment. The interior should be swabbed after use with a suitable disinfectant. Phenolics, quarternary ammonium compounds and aldehydes can be use for disinfecting these surfaces. Users of chlorine compounds should be aware of their corrosive nature. The use of alcohols should be undertaken with caution because of the risk of fire. Heavy duty polyvinyl chloride (PVC) or rubber gloves which provide suitable protection for the hands and wrists which can be disinfected for re-use should be worn when cleaning MSCs.

Note 1:
In cases where fumigation may be ineffective, it may be necessary to have MSCs designed to allow contained removal for suitable dispersal, for example incineration.

Note 2:
At the selection of disinfectants occupational health aspects should be considered.

10.2 STAINLESS STEEL COMPONENTS

Considerable care has been taken in the selection and processing of the stainless steel components used in the construction of this equipment, however even stainless steel can be damaged by chemical attack.

It is therefore important to ensure that any cleaning or disinfecting procedures used will not cause a chemical attack that may damage the surface of the stainless steel. Work surfaces should be kept clean and free of chemical liquids, particularly those containing Chlorine.

Liquids or vapours containing Chlorine are known to cause gradual staining of stainless steel. To avoid this, when chemicals are used containing Chlorine all surfaces should be thoroughly dried and all traces of the solution removed, the area should then be treated with a neutralising agent. Open vessels left inside the equipment

that are likely to cause Chlorine vapours may also result in staining of the metal surfaces.

Should the surface of the stainless steel become stained, it may be cleaned by mechanical polishing and special treatment of the affected area. Our service department can help with this process.

Note:
When cleaning to remove bio organisms the method we recommend is to wash with 40% ethanol or equivalent in all poor access points, e.g. corner of liners. It is important to ensure that full surface contact is achieved and the use of cotton buds is recommended.

10.3 PLASTIC COMPONENTS

Cleaning of the plastic items should only be carried out with mild detergent or chlorine based cleaning solutions. Care must be taken not to apply chlorine solutions to any stainless steel metalwork, as this will potentially cause staining.

Do not apply heat, abrasive materials, solvents or solvent wipes to the surface as this can cause irreparable damage. Special care must be taken to avoid scratching of the surfaces.

10.4 PAINTED AND OTHER COMPONENTS

Caution:
Do not use water around electrical connections, switches etc.

To clean all painted and other components use a damp cloth and, when required, a liquid detergent.

Note:
Do not use abrasive cleaners.

11 CONTROL SYSTEM: CUSTOMISATION AND CALIBRATION

It is strongly recommended that BIOQUELL or a trained agent of BIOQUELL is used to customise, and calibrate the cabinet. To do this work a PC with appropriate operating system is required as well as the set-up software which is available from BIOQUELL.

11.1 INTRODUCTION

The microprocessor based control system used in the cabinet allows the user two main advantages over the conventional analogue system. These are:

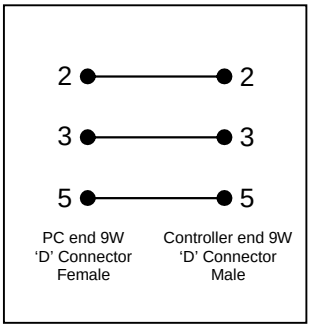
(a) Cabinet functions can be customised to the user's requirements.

(b) Calibration can be performed remote from the cabinet itself, without the need to access electrical components located in a potentially hazardous compartment.

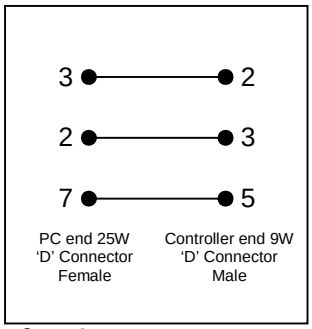
Executions of both of these tasks are made simple and quick with the use of dedicated set-up software obtainable form BIOQUELL.

Equipment required to run the set-up software comprises a communication cable and a Personal Computer (PC) with MS Windows™ installed. The PC's monitor should support a screen resolution of at least the VGA standard.

The communications cable to connect PC and cabinet controller will need to conform to either of the illustrations in Fig. 13 below. The choice of cable will depend on the connector type of an available serial port installed on the PC.



(i) If PC has 9w connector (most portables)



(ii) If PC has 25w connector

Note:
The numbers refer to the pin references on the connector.

Figure 13 Communication Cable

Suitable cables, ready made can be purchased from computer or electronic suppliers. BIOQUELL stock the variant depicted in Fig. 12 (i); Part No. M52932.

11.2 INSTALLING THE SET-UP PROGRAM

To install the BSC Set-up program on the computer, use 'Explore' and install the program by selecting the file named 'Setup', in the same way that other programs are installed. To check if the operating system installed on the computer is compatible with the program refer to BIOQUELL.

After completing the installation, an icon will be created. Double click on the icon (a computer terminal labelled 'BSC') to run the Set-up programme.

The screen shown in Fig. 14 will be displayed. The screen layout has been designed for use with a variety of screen devices; for this reason, it should always be used in full screen mode or it is possible only part of the set-up blocks will be visible.

Connect the computer to the 9-way 'D' connector on the top right of the cabinet using a suitable cable. Connect the computer end of the cable to an available serial port; COM1 or COM2. This could be either a 9-way or 25-way male 'D' connector (see Fig. 13).

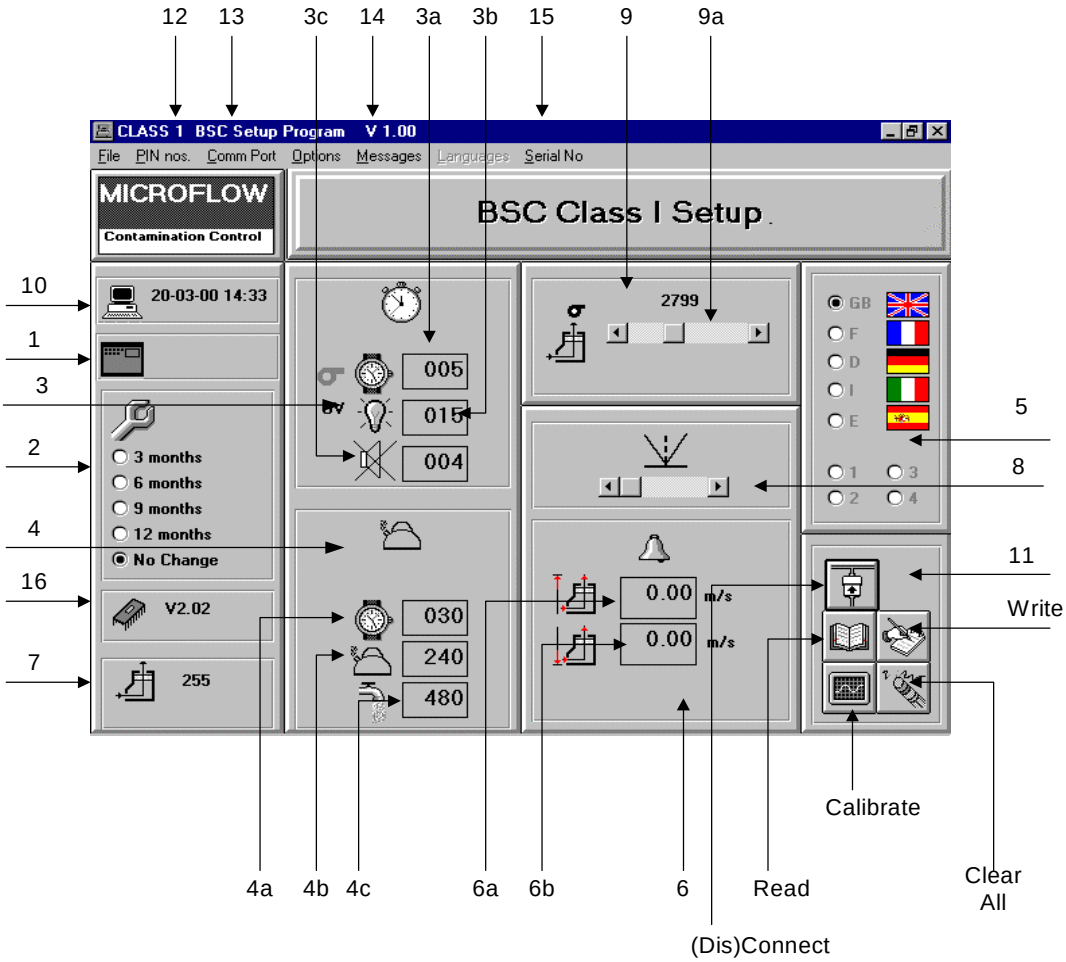


Figure 14 Typical Controller Set-up Screen

11.3 CUSTOMISATION OF CONTROLS

A number of parameters relating to the use of the cabinet can be customised according to individual preference or requirements; these consist essentially of: timer settings, updating of the controller clock, and language of the messages and prompts shown on the display. The numbers of the following descriptions relate to the features in Fig. 13.

Note:
Text in **bold** found in the following descriptions relates to options found in the set-up screen (Fig. 14); clicking the left mouse button with the pointing device on the symbol, its adjacent box or either of its buttons, (whichever is appropriate), will effect a routine or select the appropriate option.

1 Controller Clock

The controller clock is automatically updated whenever communication is established between the computer and

controller. Ensure that the computer date/time is correct adjusting it, if necessary, using the date/time function. To update the clock, click on **Connect**. If all other operations are completed, break the computer/controller link by clicking on **(Dis)Connect**.

2 Service Due

To change the Service Due date, click on one of the time increments shown under the spanner. On writing data to the controller (see para 11 'Write' in this Section), the service due date will be modified by the selected increment from the date shown in area 1 of Fig. 14.

3 Timer Settings

The settings for the timers in 3a to 3c are changed by clicking in the appropriate box and then typing the required time. The time entered is in minutes for which the device is active. Values can range between 0 and 255 minutes for the mute timer and 0 to 999 minutes for other parameters. For further descriptions of the functions referenced, refer to Section 5.1 'Control Panel'.

3a Overrun timer

Pressing the 'FAN DELAY OFF' button causes the fan to continue running for the time period entered.

3b UV timer

Pressing the 'UV' button switches the UV lamp on for the time period entered.

3c Mute timer

Pressing the 'MUTE' button mutes the buzzer for the time period entered.

4 Vaporiser Cycle

The vaporisation cycle consists of sequential phases, with configurable durations of between 0 and 999 minutes. To change the settings, after **Connect**ing, click in the relevant box and edit as required.

If these are the only operations to be carried out, after amending the values, click on **Write**, followed by **Disconnect**.

4a On time

This is the time at the start of the cycle when the vaporiser heater is powered. Choose a suitable time to achieve evaporation of all of the fumigant solution, but not to run the heater needlessly. A thermostat will break (and reset) power

to the unit if the evaporation temperature is exceeded. As a guide, if 22 ml of approximately 40% solution with an equal volume of water is being used, then 26 minutes should be an appropriate value for this timer.

4b Fumigation time

This is the time required for the fumigant to sterilise the cabinet internal surfaces and all installed components. Thus, choice of an appropriate value will depend on the sterilising agent, its concentration, and the nature of the source of contamination within the cabinet.

A figure of 240 minutes is suggested as a suitable value, assuming 40% solution Formaldehyde is being used.

4c Purge time

This is the time period following fumigation when the fan operates to extract the sterilising agent out of the cabinet. Again, careful consideration needs to be given to the choice of this value since an adequate time needs to be allowed to ensure that all traces of the material have been removed. The following points should be remembered:

(i) Although the OES (Occupational Exposure Standard) may be satisfied and the presence of the fumigant is not detected by smell, the working area of the cabinet may still constitute a hazardous environment towards the material being processed.

(ii) Trials with the cabinet have found that concentration levels of fumigant within the cabinet when subjected to purging action (exhaust ducted outside laboratory), drop rapidly initially, but a disproportionate time is required for final reductions to the acceptable level.

(iii) A value for this time of 240 minutes has been found to be appropriate to bring concentration level within the currently published OES value (2 ppm). However, your Safety Officer should be consulted for definite guidance on this and other timer settings suggested.

5 Language

The messages displayed on the controller screen are in English. The option to select other languages is not available.

6 Alarms

The value at which alarm limits are to be calibrated are entered in the two fields 6a and 6b. On execution of a calibration process, it is the values entered or previously

entered and stored, which the user is prompted to set in order that airflow alarms can be recorded by the controller.

The alarm values are stored as configuration files. How to **Save** and **Load** configuration files is described in Section 11.4.1 'File'.

The fields labelled 6a and 6b refer to alarm values (in m/s) of **high inflow and (low) inflow** respectively. To create a configuration file click the pointer in the relevant field, press the Delete key as required and enter the desired value. When all other desired parameters have been entered select **Save** as described in Section 11.4.1.2 'Save', to store the settings on the PC disk.

7 Sensor Output

Providing the **Show sensors** option has been selected from the **Options** menu, the fields adjacent to the symbols will display a numerical representation of the inflow sensor output values. The numbers displayed (between 0 and 255) proportionally relate, although not linearly, to the airflow over the respective sensor. Thus, observation of the values can be of assistance during: calibration, diagnosis of faults, and commissioning.

Note:
As a default, **Show sensors** is selected.

8 Setpoint Adjustment

This slider allows the controlled operating point of the cabinet fan's speed to be adjusted once calibration has been performed.

9 Fan Speed Adjustment

This control allows the speed of the main fan to be adjusted.

9a Main Fan Speed

Manual speed control of the cabinet's main fan can be achieved by use of the slider labelled 9a in Fig. 14. Manual adjustments may be necessary when a specific flow is required in the cabinet, but the use of this device is expected to be limited to occasions of testing and evaluation. To use the manual speed adjustment, the software should firstly be **Connect**ed, then manual control can be enabled by clicking on **Options** followed by **Direct Control**. Note that as a default, this option is selected.

Whenever the controller and computer are **(Dis)Connect**ed, the fan will initially operate at the speed that was previous set. The manual speed control slider is a method of dictating the preliminary speed setting from which achievement of the set point will be affected. Because controlling action is necessarily quite slow, the alarms points may be checked by employing suitable starting points for the fan and then enabling controller action by clicking on **(Dis)Connect**.

10 PC Clock

This field shows the time and date of the PC's internal clock. It is important that the PC's clock always reports the correct time and date as this is the reference used to (re)set the controller clock; whenever a connection is made between the two devices, the controller clock is automatically updated from the PC clock.

For security purposes, the controller has been programmed so that it will not accept a time update grossly behind its current reference.

11 Miscellaneous Functions

All features available from the setup screen have now been described, with the exception of buttons available at area 11 in Fig. 14. The features offered here permit control of the communication status and allow execution of important set up functions. Most symbols are self explanatory, but refer to Fig. 14 for identification. A description of the function of each is most readily understood by noting reference where their use is implicated in specific procedures described in this manual. However, for completeness, brief descriptions are now provided.

(Dis)Connect

This button serves both the functions of connecting and disconnecting the communication link between the PC and Controller. The current status of the communication link between the PC and the controller is indicated by the graphic on the (Dis)connect button.

When the communication link is disconnected the two connectors are shown separated, when connected they are together.

Read

Although all setup parameters are automatically (read from the controller and) displayed on the screen whenever a

Connection is made, **Read** will repeat this function. **Read** is therefore used after a variable has been changed and written to controller memory for example, and it is subsequently required to check the controller's current settings.

Calibrate

The calibrate button initiates the calibration cycle which is explained in Section 12 'Calibration of Airflow and Alarms'.

Clear all

Clicking on the Clear all button will reset all fields on the setup screen to their default values. Commonly, default values are zero.

Write

The Write function will load all current screen parameters to the controller memory.

11.4 MENU BAR

Facilities available from the top menu (refer to Fig. 14) are described in the following paragraphs. To display the possible options click with the pointer on the appropriate text. The available options will then be displayed in black text. Options not available will be shown in grey.

11.4.1 File

The **Load** and **Save** options allow sets of configurations to be stored on computer disc and retrieved for subsequent use. This therefore will save time entering values each time a cabinet is set-up or a series of cabinets are to be set to operate in the same way. However, since controller sensor values are not stored in the configuration file, it is essential that each cabinet is calibrated using the facility described in Section 12.2 'Calibration Procedure'.

11.4.1.1 Load

To load a configuration:

(a) Click on **File**, followed by **Load**.

(b) All files with extensions '.cfg' will be displayed; select the appropriate by double clicking on it or type its name in the **File Name** box. Click on **OK** or alternatively double click on the appropriate directory in the Directories or Drives boxes if it is stored.

(c) All the set-up parameters will then be displayed on the screen

11.4.1.2 Save

To save a configuration:

(a) Enter all the data in the relevant fields on the set-up screen

(b) Click on **File**, followed by **Save**.

(c) Type a path and file name in the **File Name** box. For easy management, the choice of a file extension '.cfg' is recommended; this will store all files of this type together and will display them each time a **Load Settings** selection is to be made.

(d) Click on **OK**.

If a configuration file is to be used on more than one cabinet, it should be saved on the computer's fixed disc. Thus the drive name and directory path should prefix the file name, e.g. C:\SETUPS\FILENAME.CFG. SETUPS is a directory specifically created for the storage of configuration files and FILENAME is a name for the file which facilitates easy identification, e.g. BS_12.

11.4.1.3 Exit

The **Exit** option can be used as an alternative to the close window ('-') button to terminate running of the set-up program.

11.4.2 PIN Nos. (item 12 of Fig. 14)

Maintenance of the PIN numbers can be carried out by selecting **PIN Nos**. The PIN numbers are the four digit codes which allow the fan selections to be locked and also allows use of the vaporisation cycle to those persons with knowledge of the applicable number. When the Connect operation has been executed the following two options are available.

11.4.2.1 Read

Allows the stored codes to be interrogated and displayed in a box on the screen.

11.4.2.2 Reset

Resets the two codes to default values.

The default values will be displayed, but for reference they are:

Fan functions locking code: 1111

Vaporiser function access code: 2222

11.4.2.3 The configuration of different codes must be carried out from the controller keypad once communication between controller and computer has been broken. To break the link, click on the **(Dis)connect** button.

Note:
The current status of the communication link between the PC and the controller is indicated by the graphic on the **(Dis)Connect** button. When the communication link is disconnected the two connectors are shown separated; when connected they are together.

The status of the communication link should not be confused with physical condition of whether the cable is connected or not, e.g. the cable may be connected but the communication link may not be made.

11.4.3 Comm Port (item 13 of Fig. 14)

The **Comm Port** menu options allow the selection of either COM1 or COM2 (serial) ports on the computer to be used for communication to the controller. By default, COM2 will be selected but the assignment can be changed to COM1 by clicking on the appropriate text.

If a portable computer is used for setting up, the use of COM1 is likely to be the only serial port available for external connections. Thus, it will be necessary to make this selection before connection to the controller can be made.

11.4.4 Options

Selecting **Options** allows enabling of the following two facilities.

11.4.4.1 Direct Control

When selected, the fan speed sliders (area 9 of Fig. 14) can be used to directly adjust the Main and Exhaust fan speeds. This is useful primarily during the calibration process described in the next section.

11.4.4.2 Show Sensors

When selected, numerically scaled sensor output values are displayed in area 7 of Fig. 14. See also Section 11.3 'Customisation of Controls'.

11.4.5 Messages (item 14 of Fig. 14)

The Messages facility allows the user to configure the following two controller's messages:

11.4.5.1 Idle Message

This is the message displayed on the cabinet's LCD when power is applied to the unit, but the fan is not operating. The message displayed is likely to be the name of the local distributor together with a contact telephone number.

11.4.5.2 Service Overdue Message

This message is displayed when the controller's current date exceeds the Service Due date. See also Section 11.3 'Customisation of Controls'.

11.4.5.3 Message Editing

To enter or change a message, carry out the following:

(a) Ensure that the communication link is connected using the **Connect** button (Fig. 14).

(b) Click with the pointer on **Messages** in the top menu bar.

(c) The screen shown in Fig. 15 will be displayed. Referring to Fig. 14, click with the pointer on the Idle Message or Service Overdue Message button to display the message for editing in the Current Selection box.

(d) Move the pointer over the first text field; the text pointer (resembling the letter 'I') will be displayed. Click with the pointer at the left hand end of the text field where the pointer will change to a blinking vertical bar.

(e) Type up to 16 alpha numeric characters; the delete and backspace keys can be used in their normal ways to correct errors.

(f) Repeat steps (d) to (e) for the second line of text.

(g) The second message can be entered by changing the Current Selection (see Fig. 15) and then repeating the above process.

(h) Store the messages in the controller's memory by clicking with the pointer on the button labelled **Write to controller** in Fig. 15.

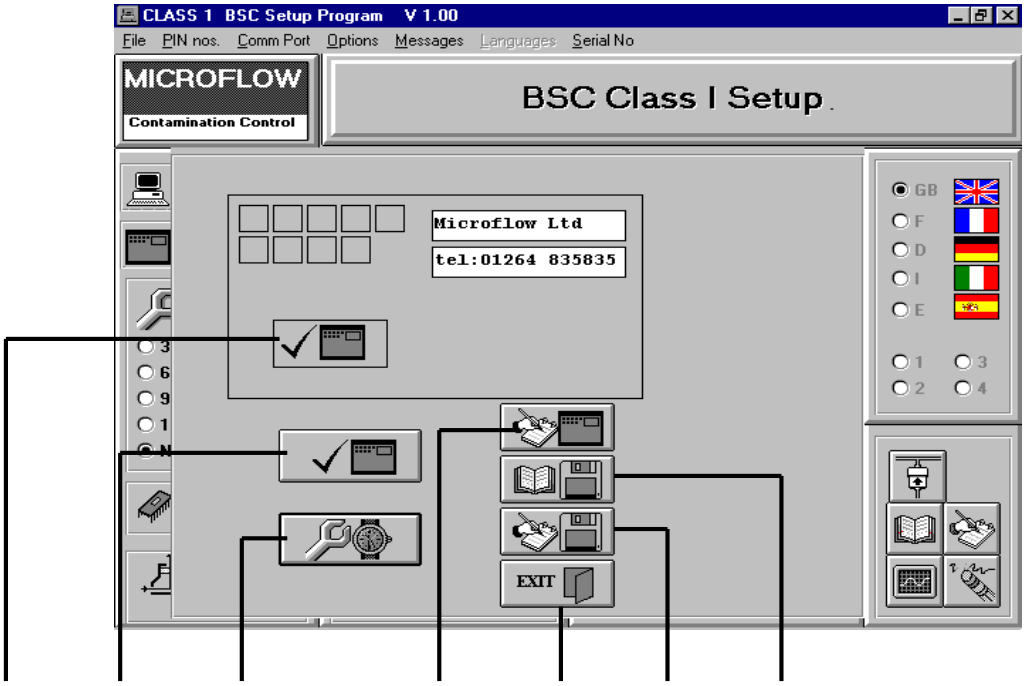


Figure 15 Message Configuration

11.4.5.4 Storing/Retrieving Messages from the PC's Disk

To store freshly entered messages on the computer's disk, or retrieve those entered on a previous occasion, carry out the following:

(a) Click with the pointer on **Messages** as described in (b) above.

(b) After entering the desired messages (to store only), click with the pointer on either of the **Read** or **Write** (to/from disk) button indicated in Fig. 15.

(c) The '**Open**' or '**Save As**' dialogue box will be displayed. These are the same as those described for other file manipulation sequences used in the controller set up process (refer to Section 11.4.1 'File').

11.4.6 Languages

The messages displayed on the controller screen are in English. The option to select other languages is not available.

11.4.7 Serial No. (item 15 of Fig. 14)

The serial number option, depending on the assigned status of the setup software, will allow serial numbers of the controller and the key of the software to be designated.

The format and designation of serial numbers is described in paras 11.4.7.1 and 11.4.7.2.

11.4.7.1 Controller Serial Number Assignment

This facility is only available to Engineer software versions.

To assign or change the serial number of a controller, follow these steps:

(a) Click with the cursor on the **(Dis)Connect** button if the controller and PC are not already connected. Next click on the text **Serial No.**

(b) Click with the cursor on the text **Update Controller**. The box shown in Fig. 16 will then appear.

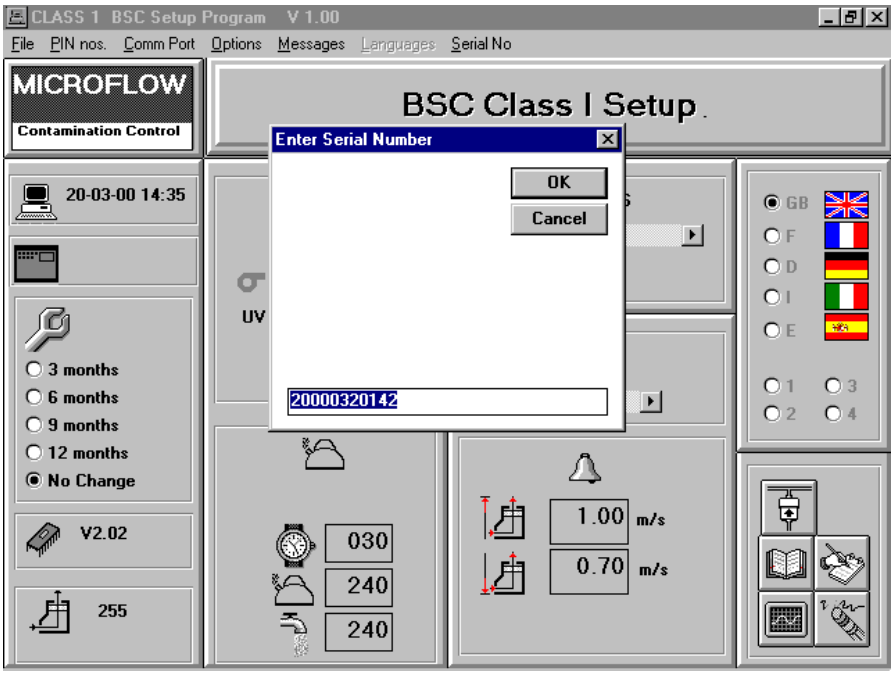


Figure 16 Software Serial Number

(c) Type the serial number of the Cabinet in the box at the blinking cursor. The serial number must comply to the format: yyyy/mm/d/nnn, (Do not enter the /.) where

- yyyy = year of manufacture
- mm = month of manufacture
- d = department number

- nnn = n th unit registered this month

11.4.7.2 Changing Software Key Number

The software key number is that combination of characters which is stored with the software and must match with the cabinet serial number (according to specified algorithm) if a connection between controller and PC is to be permitted.

The procedure for entering the key code is exactly the same as that for entering/changing the serial number. See previous paragraph for further details. The format of the key code will typically consist of a collection of upper and lower case characters. When entering the code, care should be taken to repeat the representation exactly, preserving order and case of characters.

A typical key code might be 'JGCheEGFGI'

Note :

This code can only be generated and issued by BIOQUELL (UK) Ltd.

12 CALIBRATIONS

12.1 CALIBRATION OF AIRFLOWS AND ALARMS

The setup software Calibrate facility allows calibration of the cabinet airflows and alarms. This option will allow downflow and inflow alarms to be set, together with the operating speed for the cabinet. It is then this speed that the control system will use as a reference and always attempt to maintain. The cabinet airflow can be set up to comply with BS, EN or another criteria and the requirements/procedures are described in the following paragraphs.

It is recommended that during the calibration process that where stated in the instruction that those figures are recorded for future reference.

12.1.1 CALIBRATION PROCEDURE

Note:
The 'Calibrate' process will instruct the operator to set the airflow via a (virtual) slider on the screen to the two alarm velocities of: low and high In Flow. These values will then be used by the set-up software to derive an operating condition for the cabinet such that no alarms will be activated. When the data is written to the controller, the values will be stored and used until the cabinet is next calibrated or adjusted. The operating condition of the cabinet can be manually adjusted if desired.

To calibrate the cabinet, proceed as follows:

If communication between the computer and controller is not made, click on **(Dis)Connect** (area 11, Fig. 14).

It is not unusual to see a dialog box saying "Controller not configured correctly, please configure". Disregard this message as the following process will configure the controller.

12.1.2 Initial Set-up

Configure the cabinet in Class I mode. Place the head of the anemometer at the geometric centre of the front aperture in the vertical plane and in line with the edge of the glass. The window should be secured in the working position. If necessary, place a draft exclusion screen in front of the unit under test.

Select **(Dis)Connect** to connect the unit under test. Adjust the Fan Speed Slider until a reading of 0.85 m/s (170 ft/min) is obtained, then allow the unit to settle for five minutes. Move the

anemometer head to the four corners of the working aperture and record the reading along with the geometric centre (three readings along the geometric centre on 1.5m units). Establish the mean and place the anemometer head in the position closest to the mean.

12.1.3 Click on **Calibrate** (area 11, Fig. 14). The configuration file opening screen will then appear. Select the default file 'default.cfg', double click on the appropriate text.

12.1.4 Low Inflow

A dialogue box will now appear (see Fig. 17).

The value of velocity the instruction specifies to set will be the value retrieved from the configuration file. With the anemometer at the position defined in para 12.1.2, adjust the fan to give the value of 0.7 m/s (140 ft/min). Adjustment is made by dragging the Fan Speed Slider on the calibrate screen. Alternatively, for small increments, the bar either side of the slider may be clicked, or for the smallest adjustment, either direction arrow may be clicked.

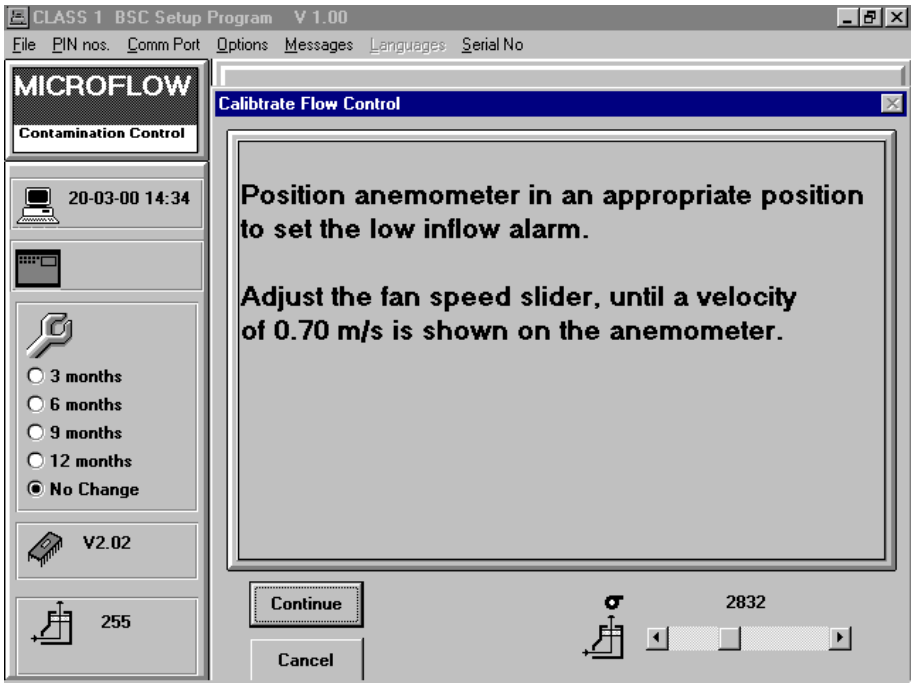


Figure 17 0.7 m/s, Low Inflow Alarm Setting

12.1.5 When the correct speed has been obtained as indicated on the anemometer, although the software waits until sensor values are stable, it is advisable to observe the sensor values until the numbers are steady before clicking **Continue**.

Click on the **Continue** button. A new dialog box will appear, "Please wait for Stabilisation" see Fig. 17. Wait until this clears, if this fails to clear within 10 minutes, there is a problem with the flow sensor as it is not stabilising, seek technical assistant.

Figure 18 "Please Wait for Stabilisation" Dialog Box

12.1.6 High Inflow

A new dialogue box will now appear, similar to Fig. 17 but with 1.0 m/s as the value of velocity the instruction specifies to set will be the value retrieved from the configuration file. With the anemometer at the position defined in para 12.1.2, adjust the fan to give the value of 1.0 m/s (198 ft/min). Should the voltage to the fan exceed 195 V ac, it is recommended to NOT to set above this figure. Dragging the slider next to Main fan speed title on the sub screen makes adjustment. Alternatively, for small increments, the bar either side of the slider may be clicked, or for the smallest adjustment, either direction arrow may be clicked.

12.1.7 When the correct speed has been obtained as indicated on the anemometer, although the software waits until sensor values are stable, it is advisable to observe the sensor values until the numbers are steady before clicking **Continue**. Click on the **Continue** button. A new dialog box will appear, "Please wait for Stabilisation" see Fig. 18. Wait until this clears, if this fails to clear within 10 minutes, there is a problem with the flow sensor as it is not stabilising, seek technical assistant.

12.1.8 After the two alarm points have been set, a dialogue box, see Fig. 19, will offer the choice either to Continue which will store the data to the controller's memory, or to Cancel the calibration process. If the latter is selected then flow settings and alarm values in the controller's memory will remain unchanged.

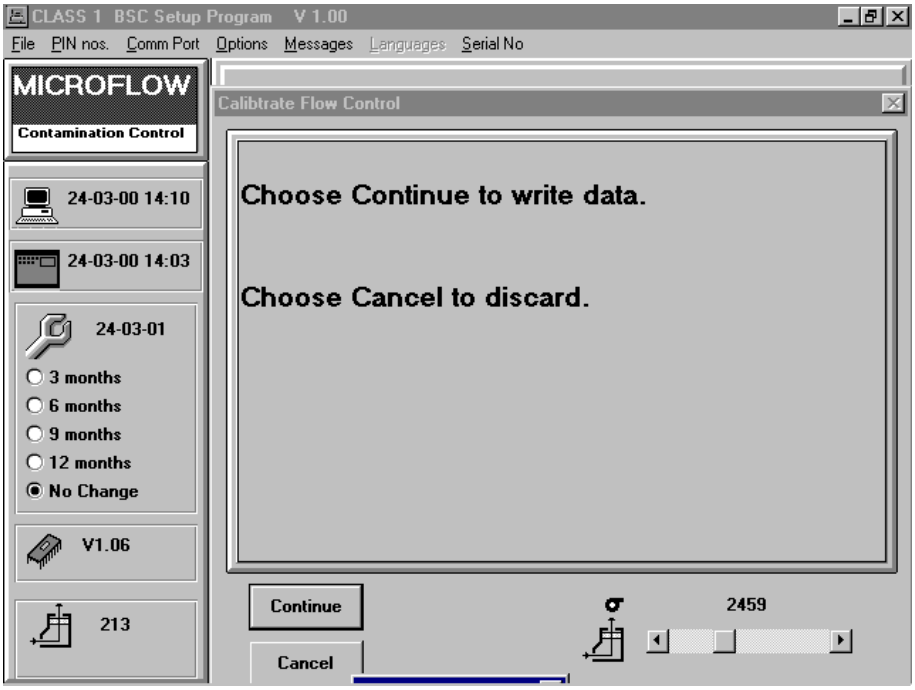


Figure 19 "End of Calibration" Dialog Box

12.1.9 Click on **Continue** and, after a short period, a new dialogue box will appear "Calibration Complete". Press "OK". Another screen will appear saying "Data written to controller" press "OK" button. Should the message appear "Write failed, try again" with two buttons "Yes" and "No". This message does not necessarily mean that it has actually failed. Press "NO"

12.1.10 Calibration is now complete.

12.1.11 Languages other than English are available on special software by order. When available, select the 'Language' required (area 5, Fig. 14), and record the language selected on the Set-up Record Sheet.

121.12 Select the required message under the **Message** drop down menu (item 14 Fig. 14). Select **Write to Controller** see Fig.15, a list will appear of all the stored messages, select the one required and then select **Load a Message** see Fig. 15. Record the message selected on the Set-up record sheet.

12.2.13 Record the Firmware version number (item 16, Fig. 14) on the Set-up record sheet.

12.2.14 The times data (areas 3 and 4, Fig. 14) are automatically loaded in to the controller memory as part of the Calibrate function (paras 12.1.3 to 12.1.10), however, check they are correct. Note the Timer Settings (area 3, Fig. 14) and the Vaporiser Cycle (area 4, Fig. 14). Record the times. The default values are:

- Overrun Timer: 005 (Fan OFF Delay Timer)
- UV Timer: 015
- Mute Timer: 000
- On time: 030
- Fumigate Time: 240
- Purge Time: 240

12.1.15 Read the **Pin nos.** (area 12, Fig.14), these should read 1111 for Normal and 2222 for Vaporiser respectively. Should these Pin Numbers differ from the above, return to **Pin nos.** (area 12, Fig.14) and select **Reset**.

12.1.16 Set the serial number. The serial number is obtained from the unit being calibrated; usually it is on a data label on the right hand side of the cabinet. Select **Serial No** and **Update Controller**. A new box will appear as shown in Fig. 16. Enter the number, for example, 20000220001 (eleven digits), the press Okay.

12.1.17 On completion of above, press **Write** (area 11, Fig. 14). Should a dialog message appear "Write failed, try again" with two buttons "Yes" and "No", this means that something has either been missed out or incorrectly entered. Check paragraphs 12.1.11 to 12.1.16 again if these are all correct press "Yes". If the message appears again, seek technical assistance.

12.1.18 **(Dis)Connect** the Set-up program from the unit under test and allow the unit to settle. Alarms may sound during this period, this is not unusual as the unit is settling. If alarms continuously sound, then the unit has NOT been set correctly and it will require re-calibration. To re-calibrate, repeat this procedure.

12.1.19 If unit does settle and no alarms sound, take final readings of all airflows and record these on the set-up record sheet then re-connect the set-up program. Record the final sensor reading, fan number (next to item 9a, Fig.14).

12.1.20 Place the glove port panel on and remove the breather filter cover and check the average inflow velocity by measuring the air velocity in the exhaust duct multiplied by the duct's cross sectional area.

This will give the volumetric rate of discharge of exhaust air which is equal to the inflow. The inflow must be greater than 0.02 m^3/s

12.2 CALIBRATION OF PRESSURE GAUGE

WARNING There are live electrics when the front cover is open and the cabinet is switched on

The manometer on the front of cabinet can be calibrated by firstly turning off the cabinet at the main power switch on top, then opening the front cover and securing it. Disconnect the pressure line into the manometer, and place into a suitable calibrated manometer. Close the front cover being careful not to crush the pressure tube. Then switch the power onto the cabinet and start the cabinet in Class III mode. Measure the pressure displayed by the calibrated manometer and record when the unit is displaying 'SAFE MODE'.

Switch off the cabinet at the main power switch, and open the cabinet front cover. Replace the pressure tube into the cabinet's manometer and then close the cabinet's front cover. Turn the main power back on and set the unit to run.

When in 'SAFE MODE' read the manometer and compare against the figure recorded with the calibrated manometer. If there needs to be an adjustment remove the black outer cover of the cabinet's manometer by twisting. At the bottom of the needle a small countersunk hexagonal head will be seen, by turning this with a Hexagonal Key the needles position can be moved to give the correct reading.

13 TROUBLE SHOOTING

Fault/Alarm	User Action
Fan and light do not operate	Check Mains Power Indicator is illuminated, if not: • Check power to unit • Check isolator switch adjacent to mains supply input socket is ON
Inflow High or Low Alarms	Check for obstructions on the exhaust outlet or at the HEPA on the side of the unit, such as the cover door being closed, if not: Mute alarm, switch off cabinet and contact service provider
Replace Filters	Mute alarm, switch off cabinet and contact service provider
Fan 100%, Battery Fail	Switch off cabinet and contact service provider
No Gas supply	Check control panel display is indicating SAFE. If it is switch off cabinet and contact service provider
UV Light not working (Fixed)	Replace UV tube, if still does not work contact service provider
Lights are not working	Replace light tubes, if still does not work contact service provider
Vaporizer not working	Incorrect PIN number, contact service provider to reset PIN.
Unit will not run in Class III Mode	Check side HEPA filter inlet is not covered by its door or other object Check front glove port panel is fitted and the magnet switch aligns with its 'target'
Unit will not run in Class I Mode	Check side HEPA filter inlet is closed with sealing door. Check glove port is removed Check main front screen is properly fitted.

14 SPARES

Refer to the Supplier or the Maintenance Provider for a comprehensive list of spares. Below are the most common parts requested:

Description	Part No	Qty per 1m Unit	Qty per 1.2m Unit
Light Tube	257-0504	2	2
Door seal (Glove Port)	ND196282	4m	5.5m
Door Seals (Hatch)	H19040001	4m	4m
Main Filter	MSABS1000-031	1*	N/A
	MSABS1200-031	N/A	1*
Breather (Inlet) Filter	MSABS1000-032	1	N/A
	MSABS1200-032	N/A	1
Pre-Filter for main Filter	PEA11105F/3	1	N/A
	PEA11105F/2	N/A	1
Pre Filter for Breather (Inlet) Filter	PEA11105F/1	1	1
Neoprene Gauntlet	CYU-306	2	2
Key for Compression Latch	H12020019	2	2
Starter for Lights	257-0381	2	2
Handscrew	H08990001	8	8

* If the unit is fitted with a double HEPA filtered exhaust 2 of these filters are fitted.

For general information on the gloves see section 9.8.

15 SERVICING RECORD

DATE	ACTION	COMPLETED BY

EC DECLARATION OF CONFORMITY FOR ATTACHMENT OF 'CE' MARK

CE

We, the manufacturer: BIOQUELL UK Limited.
52 Royce Close
Portway Industrial Estate
Andover, Hampshire
SP10 3TS
Tel: +44 (0) 1264 - 835835
Fax: +44 (0) 1264 - 835836

Declare under our sole responsibility that the appliance:

AVANCED BIO SAFETY CABINET
CLASS III/I

Serial Number as stated on Certificate of Factory Testing

Complies with the Protection Requirements of the Electromagnetic Compatibility Directive 2004/108/EC, and the Machinery Directive 2006/42/EC by means of the following harmonised standards:

BS EN 61326-1:2006

Tested By: TRaC, Holly Grove Farm,
Verwood Road, Ashley, Ringwood, Hants, BH24 2DB –
Certificate No. 5790/04 +
Certificate No. 6622/09

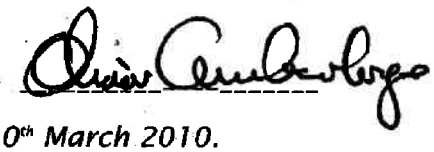
Other harmonised standards used:

EN 61010 : 2001

Responsible Person :-

*Name :- **O.R.Cumberlege***

*Position :- **Director***

Signed:- 

Date:- 10th March 2010.

APPENDIX 1 - UK APPROVED SERVICE COMPANY

We only recommend BIOQUELL, in the UK or its local service provider to carry out service and repair work. These technicians have been fully trained on the product.

To contact BIOQUELL use one of the following methods:

- Call the Service Desk on 01264 835 800 or 0800 527800
- Fax to 01264 835 801
- E-mail to enquiries@bioquell.com

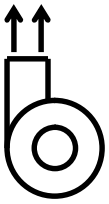
For details of our local service providers outside the UK contact BIOQUELL on +44 1264 835 800

APPENDIX 2 - SAFETY SYMBOLS

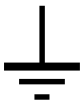
BIOHAZARD

CAUTION

CAUTION, RISK OF ELECTRIC SHOCK

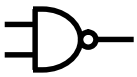


FAN

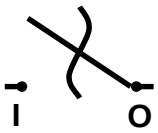


EARTH (GROUND) TERMINAL

PROTECTIVE CONDUCTOR TERMINAL



POWER



ON/OFF

APPENDIX 3 - WARRANTY

BIOQUELL UK Ltd. produces products that are warranted under normal usage against defects in workmanship and materials for one-year parts and labour costs, from the date of manufacture. The Warranty is stated in the Standard Terms and Conditions of sale.

Export and Agent retailed products are warranted directly by the Agent. Please confirm your warranty and liability status with the Agent.

In addition, the Warranty is void unless the following conditions are met:

(a) The product has been installed and used as stated within the Instruction Manual.

(b) **The warranty does NOT include servicing or maintenance.** An approved service company who have attended our training courses for your product must carry out maintenance of product. Failure to maintain or service this product will invalidate the warranty. Maintenance must be carried out in accordance with the Service Manual and include tasks within stated periods. Failure to use approved service companies or BIOQUELL UK Ltd. trained personnel for maintenance also affects the CE Marking status of the product, removing BIOQUELL's Duty of Care and responsibility

(c) Consumables such as: pre-filters, HEPA filters, light bulbs and tubes, not warranted.

(d) This Warranty is void if faults are caused by accidental damage, mishandling, adjustment by unauthorised personnel or failure to follow the correct maintenance and safety precautions as stated in the Instruction Manual.

(e) The Warranty expressly provided for herein is the sole Warranty provided in connection with the product and no other Warranty, expressed or implied, is provided. BIOQUELL UK Ltd. assumes no responsibility for any other claims, consequential (including lost time or profit) or other damage, whether based in contract, tort or otherwise, not specifically stated in this Warranty.

(f) Except in respect of death or personal injury caused by Seller's negligence, or as expressly provided in these Conditions, Seller shall not be liable to Buyer by reason of any representation (unless fraudulent), or any implied warranty, condition or other term, or any duty at common law, or under the express terms of the Contract for any loss of profit or any indirect, special or consequential loss, damage, costs, expenses or other claims (whether caused by the negligence of Seller, its servants or agents or otherwise) which arise out of or in connection with the supply of the Goods or their use or

resale by Buyer, and the entire liability of Seller under or in connection with the Contract shall not exceed the price of the Goods.

Note:
When requesting a Warranty visit, please have the following information available:

(i) Product model number and name.

(ii) Serial number.

(iii) Date of last service, and Service Company.

(iv) Nature of fault and any other comments likely to indicate cause of fault.

(v) A Purchase Order number to cover costs incurred if visit is outside the scope of the Warranty.

BIOQUELL UK Ltd., or other nominated personnel will carry out warranty visits.

(g) In the event of any health and safety incidents please advise us in writing at the earliest opportunity.

(h) This warranty and all other contractual issues shall be governed by English law and the parties agree to submit to the nonexclusive jurisdiction of the courts of England.